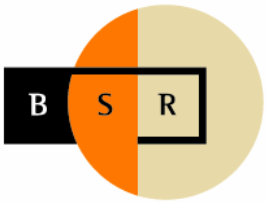

Business for Social Responsibility

A Three-Pronged Approach to Corporate Climate Strategy

Prepared
October 2006

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Since 1992, non-profit Business for Social Responsibility (BSR) has been a leading provider of innovative business solutions to many of the world's leading corporations. Headquartered in San Francisco and with offices in Paris and Guangzhou, China, BSR is a nonprofit business association that serves its 250 member companies and other Global 1000 enterprises. Through advisory services, convening and research, BSR works with corporations and their stakeholders to create a more just and sustainable global economy. For more information, visit www.bsr.org.

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Executive Summary

> *"The key for corporations is to make plans now that will help them prosper in such an uncertain future. Until now it has been easier to turn a blind eye to impending challenges. But now the only option is to tackle them head on."*
>
> - Global Finance, 2006[1]

Climate change is already happening, and businesses are being affected. The insurance industry has been one of the most vocal industries about future prospects in a changing climate.[2] As underwriters of risk, insurance companies serve as canaries in the mine. Climate-related risks run the gamut from weather-related impacts on infrastructure and operations to dislocations of people and accompanying shifts in consumer demand.

The challenge is how to respond to climate change in a way that makes sense for your company. This report does not argue about the science of climate change, nor does it review the assertions of climate change skeptics. Instead, it examines what a company should *do* about climate change.

Rather than offering a list of potential actions as others already have,[3] we ask: **what would be the components of a smart corporate strategy for companies that are serious about climate change?** We provide a brief background on corporate reactions to climate change and then shift to where companies can focus and how they can move towards becoming carbon neutral.

We provide a full picture of the efforts that companies will need to create an integrated climate change strategy. Business leaders increasingly recognize that the time for isolated carbon and greenhouse gas initiatives is over. A focus on "end of the pipe" technologies is no longer sufficient. Business has an opportunity to consider the full expanse of carbon and greenhouse gas emissions—across their company, their operations and the lifecycle of products and services—and to chart a course to carbon neutrality.

The spectrum of needed actions spans from increasing the efficiency of energy use to offsetting emissions to shifting to decarbonized energy and renewables. This range—of efficiency, offsets and renewables—applies to all aspects of businesses, from

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1 Keeler, Dan. "Crunch Time," *Global Finance:* The Energy Issue, September 2006.
2 Lloyd's of London. *Climate Change: Adapt or Bust.* Accessed October 10, 2006 from http://www.lloyds.com/News_Centre/Features_from_Lloyds/Climate_change_adapt_or_bust.htm.
3 For examples of potential actions, visit the U.S. EPA's Global Warming – Actions website at http://yosemite.epa.gov/oar/globalwarming.nsf/content/Actions.html and Environmental Defense's website at http://www.environmentaldefense.org/actioncenter.cfm; http://www.climatecrisis.net/takeaction/. Both accessed October 10, 2006.

materials to product design, raw material sourcing, service delivery and disposal, or the "end of useful life" of products. The span is broader than many companies consider, and it offers corporate managers a larger playing field in which to define ambitious, integrated and profitable climate change-focused strategies, goals and actions.

Climate change-focused corporate actions have potential upsides, in the form of new products and new markets, as well as risks, such as those associated with large-scale renewable energy investments. We offer examples of what companies in a number of industries are doing to limit risk and liability, position for first mover advantage and expand their market share in the years ahead.

To enable companies to fully consider the array of climate change strategies, BSR has designed three new multi-year initiatives for BSR member companies:

1. **Lessening climate-related emissions within the food and agriculture sector through considering supply chain, sourcing and trucking issues.** This initiative will work with companies on local procurement and on developing the tools needed to pilot and expand local sourcing.

2. **Providing member companies with an understanding of the full range of voluntary CO2 offset programs** and a tool for assessing when to act and which program to select.

3. **Engaging auto, energy and agriculture companies on biofuels and mobility.** Through a series of multi-sector dialogues and briefings, we will explore the impacts of emerging supply chains in biofuels.

To learn more about these initiatives,
please turn to the Appendix or contact:
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Introduction: Price Signals and Shifting Investment Dollars

"CO2 gets attention from people like oil-refinery managers these days. There's a clear price signal. Projects to control emissions are worth investing in."

- David Hone, Shell's Climate Change Adviser[4]

"We believe that climate change is one of the most significant environmental challenges of the 21st century.… How governments and societies choose to address climate change will fundamentally affect the way present and future generations live their lives."

- Goldman Sachs, 2005[5]

A significant amount has been written about how we know that climate change is happening and what risks exist for business. The global average surface temperature has risen nearly 0.36° Fahrenheit (0.2° Celsius) in the last 30 years, bringing the overall temperature to its warmest in the current interglacial period that began about 12,000 years ago.[6] The global temperature is now within about 1.8° Fahrenheit (1° Celsius) of the maximum temperature of the past million years.[7] Scientists agree that this warming trend is a result of carbon dioxide emissions, as well as other greenhouse gasses produced by human activities. There is also scientific consensus that climate change is making extreme weather more frequent, more ferocious,[8] and increasingly destructive.

We are not talking anymore about what climate models say might happen in the future. We are experiencing dangerous human disruption of the global climate and we're going to experience more.

- John Holdren, President of the American Association for the Advancement of Science, 2006

If further global warming reaches 2 or 3 degrees Celsius, we will likely see changes that make Earth a different planet than the one we know. The last time it was that warm was in the middle Pliocene, about 3 million years ago, when sea level was estimated to have been about 25 meters (80 feet) higher than today.

- James Hansen, NASA's Goddard Institute for Space Studies, New York, 2006

4 Quoted in *The Economist*, September 7, 2006.
5 Goldman Sachs. "Environmental Policy Framework," November 2005.
6 James Hansen, Makiko Sato, Reto Ruedy, Ken Lo, David W. Lea and Martin Medina-Elizade. 2006. "Global Temperature Change." Proceedings of the National Academy of Sciences of the United States of America
7 Ibid.
8 See the following three articles: Black, Richard. "Humans 'Causing Stronger Storms'," *BBC News*, September 11, 2006, accessed October 10, 2006 from http://news.bbc.co.uk/2/hi/science/nature/5335362.stm. "Study Strengthens Link Between Global Warming, Fiercer Storms," *Environmental News Service*, September 12, 2006, accessed October 10, 2006 from http://www.ens-newswire.com/ens/sep2006/2006-09-12-02.asp. Goudarzi, Sara. "Global Warming Nears a 'Dangerous' Level: Researchers Say Average Temperatures Are Close to a Million-Year High." Accessed October 10, 2006 from www.livescience.com.

For businesses, more frequent and more intense weather is significant. It can disrupt operations and transportation. It can damage warehouses and retail stores, particularly in coastal zones and storm-prone regions. It can dislocate customers, potentially dampening consumer demand and purchasing power. And it can completely change the risk equation of where and how companies can operate profitably.

The insurance industry has been researching climate change for decades, and the industry has become one of the most vocal advocates for managing climate risk. In June 2006, Lloyd's of London issued a report entitled *Climate Change: Adapt or Bust,* which states that: "Scientific evidence shows that global temperature, sea levels and rain fall are rising faster than previously thought. And, if the industry wants to survive, it must adapt its responses to these trends sooner rather than later."[9]

The potential impacts of climate change on the insurance industry can already be seen in the bottom line. While no individual natural event can be directly attributed to climate change, the increase in incidence and ferocity of storms and hurricanes is increasingly being linked to climate shifts. Insurer Swiss Re calculates that natural disasters cost approximately US$230 billion in 2005; the insurance industry was on the hook for a third of that total.[10] Hurricanes Katrina and Rita "toppled what companies perceived as a worst-case scenario," states Cindy Gordon of the American Petroleum Institute. And "this is just the beginning," warns Peter Höppe, head of Geo Risks Research at Munich Re: "As climate change is accelerating, we will have to adapt to many more extreme events."[11]

> HSBC considers climate change to be the single largest environmental challenge of this century. Many of potential solutions are medium term. HSBC's approach is to support a transition to a lower carbon economy.
>
> - HSBC, "Energy Sector Risk Policy," 2006

In September of 2006, Richard Branson of the Virgin Group donated a projected US$3 billion over 10 years from his five airlines and train company to the development of low-carbon energy sources such as wind turbines, cleaner-burning aviation fuel and "cellulosic" ethanol. The Virgin Group has also launched Virgin Fuels, a company that will invest up to US$400 million over the next three years in biofuels. The first investment was made in Cilion, a new company building ethanol refineries that will burn far less fossil fuel than conventional biofuel operations.

- Revkin, A. "Branson Pledges Billions to Fight Global Warming," *New York Times*, September 21, 2006

9 Lloyd's of London. *Climate Change: Adapt or Bust.* Accessed October 10, 2006 from http://www.lloyds.com/News_Centre/Features_from_Lloyds/Climate_change_adapt_or_bust.htm.
10 Vigar, David. 2006. *Climate Change: The Role of Global Companies*. London: Tomorrow's Company.
11 "Business on a Warmer Planet," *Business Week*, July 17, 2006.

Despite the significance of climate change, Rolf Tolle, Lloyd's Director of Granchise Performance states that "no one has an accurate picture of the financial impact climate change could have on the [insurance] industry." According to Tolle, the insurance industry's strategic response has been too slow:

> "Although it's almost two decades since the UN recognized that climate change was a catastrophic threat to earth, it's clear that the insurance industry has not taken catastrophic trends seriously enough. As an industry we must work together to understand and manage these new risks, and to change our behavior."[12]

Growing concern over climate change is leading some insurers to provide incentives for climate-aware actions. Marsh, the world's largest insurance broker, and AIG, the world's largest insurer, have launched carbon emissions credit guarantees and other new renewable energy-related insurance products that seek to engage more companies in carbon offset projects and carbon emissions trading markets.[13] Firemen's Fund Insurance is in the process of reviewing and launching new "green" coverage, including rate credits and other incentives for commercial building owners who re-build damaged properties using energy-efficient design.

More than 225 investment houses with assets of more than $31 trillion—including Morgan Stanley, Goldman Sachs and AIG—have signed up to the Carbon Disclosure Project. The Project requests emissions data from major companies and posts it publicly for all investors. In 2005, the Project launched the Climate Leadership Index, the first global stock index for companies with leading climate strategies.

- Macalister, T. "Investors Urged to Back Climate Change Awareness with Action," *The Guardian*, September 2006

Investors are also becoming aware of the climate change risks and betting on climate-aware alternatives. The Goldman Sachs Group announced in 2006 that it plans to increase investments in renewable energy while working on a range of other climate change actions internally, such as decreasing greenhouse gas emissions.[14] Goldman joins peers in the investment world such as Citigroup and HSBC, both of which are incorporating climate risk into their lending policies.[15] Investment houses, such as Generation Investments, are pioneering investment research techniques that analyze the 'carbon intensity of profits' to understand which companies are better positioned to succeed in a carbon-constrained world.

12 Lloyd's of London. *Climate Change: Adapt or Bust.* Accessed October 10, 2006 from http://www.lloyds.com/News_Centre/Features_from_Lloyds/Climate_change_adapt_or_bust.htm.
13 CERES. 2006. "Dozens of New Insurance Products Emerging to Tackle Climate Change and Rising Weather Losses." Accessed October 10, 2006 from http://www.ceres.org/pub/publication.php?pid=0.
14 Goldman Sachs. November 2005. "Environmental Policy Framework."
15 Information retrieved from websites at http://www.citigroup.com/citigroup/environment/climatechange.htm and http://www.hsbc.com/hsbc/csr/environment/hsbc-and-climate-change. Both accessed October 10, 2006.

Venture capitalists and corporate R&D divisions are investing in "clean technology" of all types, including renewable energy such as wind.[16] Prominent investors including Bill Gates, John Doerr and Vinod Khosla are speaking about the financial prospects of energy solutions that transition our economies away from fossil fuels; their goal is to find the Netscape of the clean technology market.

In North America "clean tech" has become the fifth largest venture capital investment category, after biotechnology, software, medical and telecommunications. Analysts estimate that the clean energy market will expand robustly over the next decade, from its present US$39.9 billion to US$167.2 billion.[17] These investments match an expectation of an exponential rise in demand for clean technology. BP predicts a market for solar, wind, hydrogen and gas at US$600 billion by the year 2020.

These numbers are catching the eye of major investors. "Wall Street likes huge markets," says Mark Tercek, a Managing Director at Goldman Sachs, "and the carbon emissions market could well become the biggest commodity market in the world."[18] Goldman Sachs recently bought a 10 percent share in Climate Exchange, a trading platform that now dominates the European and U.S. markets.[19] Large investors, such as the California state pension fund (CalPERS) and the California teachers' pension fund (CalSTRS), are taking note of shareholder concerns and future carbon-related risks, and are expressing preferences for "green" investments.

The expansion of climate-aware investors is reflected in rapidly growing attendance of climate-focused gatherings. The 2003 inaugural Investor Network on Climate Risk had participants representing assets of US$600 billion, while in 2005, participants represented US$2.7 trillion.[20] "Our goal is to have the SEC clarify their guidelines so companies must include climate risk information in their reporting," says Chris Fox, coordinator of the Investor Network on Climate Risk.[21] The FTSE4Good index has issued specific criteria on climate change that requires companies to have a clear greenhouse gas reduction strategy and a "long-term public goal of significant reductions over a specified time period."[22]

The shifting investment dollars are a signal of where the market is headed. These market shifts are results, directly or indirectly, of three fundamental changes in the operating environment.

First, the consensus on the science is solidifying, for good. A recent U.S. National Oceanic and Atmospheric Administration report put the final proverbial nail in the

16 See the proclamations of John Doerr on opportunities in clean tech as the next realm of opportunity in Hibbard, Justin. "Doerr to the Environment," *Business Week*, August 14, 2006.
17 Innovest. "The $31.5 Trillion Question: Is Your Company Prepared for Climate Change?" September 18, 2006. Accessed October 10, 2006 from www.greenbiz.com.
18 Tercek, Mark. "A View from Wall Street," Portland Katoomba Group meeting, June 7-9, 2006.
19 Thomas, "Goldman Takes Stake in Climate Exchange," *The Financial Times*, September 20, 2006.
20 "A Coat of Green," *The Economist*, September 7, 2006.
21 Green, Paula. 2006. "Environmental Impact," *Global Finance*: The Energy Issue, Vol 20, No.8.
22 *Ethical Performance*. "FTSE4Good Index Unveils Criteria on Climate Change," September 2006.

coffin of climate skeptics. The 2007 report from the Intergovernmental Panel on Climate Change is expected to represent "a level of consensus unusual for the scientific community." These reports and others signal a fundamental shift from the debate about *whether* climate change exists to a debate over *how to best manage and adapt* to climate change.

Second, extreme weather events are becoming harder for the general public to ignore and more difficult for climate change skeptics to explain. The past decade had eight of the hottest years on record. Hurricanes are increasingly frequent and intense, most vividly illustrated by images of New Orleans underwater. The melting of Artic glaciers is occurring at rates faster than scientific models anticipated. The temperature increases are tracking with human emissions of greenhouse gases. Scientists assert that these data points mean that we have already entered the era of adaptation to climate change.

Third, political dialogue has shifted from whether climate change is happening to how to address it. An ever-increasing number of regulatory, policy and legal drivers for climate change action, both internationally and within countries such as the U.S., make corporate strategies to manage climate risk more important.

The European Union's Emissions Trading Scheme is a cap-and-trade system that assists companies in identifying the most cost-effective ways to reduce emissions and meet Kyoto Protocol targets. Companies in the most energy-intensive sectors have been a key focus of carbon trading, but other industries will fall under the regulatory umbrella as soon as 2008. The EU has set the ambitious target of obtaining 12 percent of its total energy and 22 percent of its electricity from renewable energy sources by 2010.[23]

In the U.S., 279 cities have signed on to Kyoto targets. California has passed legislation to reduce emissions from all industries by 25 percent by 2020. Seven northeast states are on their way to capping and trading emissions from power plants, and six western governors are proposing federal action. In addition, lawsuits are beginning to be filed: automakers are the defendants in 'public nuisance' lawsuits for financial damages stemming from the climate change impacts of their products.[24]

> The State of California has sued six of the world's largest automakers, including GM, Ford, Chrysler, Honda, Toyota and Nissan, on the grounds that greenhouse gases from the companies' vehicles have caused billions of dollars in damages. The lawsuit is the first to focus on manufacturers' liability for damages caused by their vehicles' emissions. The state is spending millions of dollars to deal with climate change-related impacts such as reduced snow pack, beach erosion, ozone pollution and endangered animals and fish. Officials say that this lawsuit is one way to address those costs.
>
> - Kahn, M. "California Sues Carmakers Over Global Warming," Reuters, September 20, 2006

23 Vigar, David. 2006. *Climate Change: The Role of Global Companies*. London: Tomorrow's Company.
24 Murphy, Brett. 2006. "California Sues Automakers for 'Public Nuisance' of Global Warming," *Jurist Legal News and Research*, September 20, 2006.

At the U.S. federal level, increasing funding is available for alternative fuels, and there is near certainty of a nation-wide climate change policy in the near future, regardless of whether the Bush administration changes course on climate. Numerous proposed bills are circulating in Congress, and prominent members of the business community have been encouraging federal action.[25] The U.S. Environmental Protection Agency, Government Accountability Office and the Securities and Exchange Commission have been formalizing processes to assess corporate disclosure on climate change.[26] The reality for companies is that the latticework of requirements on disclosure and lowering climate-related emissions is rapidly shifting in the U.S. on a state-level and now nationally.

Corporate decision makers are noticing these changes. AIG, Allianz and Goldman Sachs have released climate change policies in the past 12 months, and Citigroup, JP Morgan Chase, Merrill Lynch and Morgan Stanley have begun to analyze the performance of carbon markets. Eighty-seven percent of companies responding to the Carbon Disclosure Project's request for information assert that climate change presents "commercial risks and/or opportunities." Yet action by businesses still lags: less than half (48 percent) of these companies have implemented a greenhouse gas reduction program.[27]

Lagging action may become a larger issue if consumer concerns and preferences shift. A recent study identified the airline, food and beverages sectors as the most vulnerable to reputation damage due to climate change inaction and concluded that climate change would become a mainstream consumer issue by 2010.[28]

Where does a corporate manager begin in thinking about corporate climate strategy?

25 The Carbon Trust. "Brand Value at Risk from Climate Change," November 15, 2005.
26 Energy Washington, "SEC Considers Penalties For Poor Climate Change Risk Disclosure," May 18, 2005.
27 Innovest. "The $31.5 Trillion Question: Is Your Company Prepared for Climate Change?" September 18, 2006. Accessed October 10, 2006 from www.greenbiz.com.
28 The Carbon Trust. "Brand Value at Risk from Climate Change," November 15, 2005.

1. Charting a New Course: Considering Climate Change in Business Terms

"While the government is thinking about policies to reduce climate change, business is focusing on adaptation. How do we adapt to a future of melting permafrost, less water, and more extreme weather?"

- Robert Page, VP, TransAlta Corp[29]

The scope of climate change leaves many within corporations asking why they should act, not to mention how. What can one company possibly do? But the option of not acting is less attractive given emerging regulatory action, growing recognition of business risks and the benefits of action, such as brand impacts and early mover advantages.

A decision to act on climate change can raise more questions than it answers. What should a company's priorities be? Are a series of corporate policies sufficient, or is climate change significant enough to business operations to warrant a strategic focus? What should a corporate climate change strategy focus on? Why? And how? Would climate change action buffer a company from erratic energy prices, assist in anticipating regulation, meet emerging shareholder expectations, keep insurance rates low, maintain license to operate or be responsive to stakeholder issues? If so, how can integrated action be undertaken across functions, units and divisions to address a business' greenhouse gas emissions, from smokestacks and tailpipes to deforestation?[30]

> Innovest research estimates that well-positioned companies could have revenues yielding US$298 million, or 10.6 percent of 2005 earnings (EBITDA). The worst positioned companies could lose 25 percent of EBITDA due to regulatory compliance costs. Assuming abatement costs of US$25 per ton, Innovest estimates that many companies could reduce their "business as usual" 2012 emissions to 10 percent below 2005 levels for less than 1 percent of their reported 2005 earnings.
>
> - Innovest. "The $31.5 Trillion Question: Is Your Company Prepared for Climate Change?" September 18, 2006

Understandably, today's companies are overwhelmed with the range of choices among climate change initiatives, particularly in the U.S., where an array of voluntary programs have evolved to fill the regulatory vacuum. Numerous voluntary programs are offered by federal and state governments, NGOs and trade associations. The U.S. EPA alone has dozens, and there are state-level, NGO and trade association programs such as carbon neutralizing product certification programs like Climate Neutral, operational greenhouse gas reduction programs like Climate Northeast, targeted sector reduction initiatives such as Climate Cool Concrete, NGO-built environment energy efficiency certifications like

29 Carey, J. "Business on a Warmer Planet," *Business Week*, July 17, 2006.
30 For an example, see Environmental Defense's website at http://www.environmentaldefense.org/documents/4930_TropicalDeforestation_and_ClimateChange.pdf. Accessed October 10, 2006.

the U.S. Green Building Council's LEED Certification, trade association standards such as the Voluntary Carbon Standard, investor sponsored risk disclosure programs like the Carbon Disclosure Project, and state-level registries such as the California Climate Action Registry. But there are few ways to identify the relative merits of the programs.

The array of options underscores the importance of stepping back and thinking strategically about how to move forward on climate change responses. Companies need to be forward-looking and consider strategically how to address a changing climate.

Responding to climate change with only small-scale initiatives, such as a travel offset program or a few philanthropic donations, will not result in the approximately 70 percent decreases in emissions that scientists estimate are needed to preempt irreversible and chaotic climatic cycles. Climate modeling highlights that action over the next few years will dictate the difference between a 2° and 4° F increase, which in turn determines the extent of sea level rise from polar melt.

While small-scale programs and philanthropy are important, broader scale and audacious thinking is now needed. The corporate goal of zero emissions is the core of what should be considered, given scientific evidence, the emerging regulatory context and growing awareness. The goal of zero emissions is driven by climate change models that show a need to decrease global emissions by about 70 percent, a figure that becomes even more significant given the projected annual growth rates in carbon emissions from the U.S. (1.5 percent), China (3.4 percent) and India (3.0 percent) over the next 20 years. [31] Research has increasingly highlighted that "positive feedback loops"—in which one consequence of climate change (*e.g.* melting icecaps) accelerates other dynamics (*e.g.* ocean current changes due to differential amounts of salinity)—are leading to a faster pace of climate change than anticipated.

Business represents the vast majority of greenhouse gas emissions through industrial processes, transportation and commercial energy use,[32] thus there is a need to create and maintain momentum towards zero emissions worldwide. A broad-based consensus within the scientific community indicates that it is time for audacious goals and action.

How can a company begin to think about the organizational change implications of setting zero emissions goals? The question of large-scale corporate change has been analyzed in numerous articles and reports.[33] The most durable corporate change programs have intertwined clear, bold goals that can be meshed with corporate culture and identity to create ongoing forward movement. At Toyota, the spirit of the enterprise is infused with long-term thinking and maintaining a learning-oriented culture. Toyota executives assess what the industry will look like in the future and ask "who do we want

31 Energy Information Administration, U.S. Department of Energy. "India: Environmental Issues (2004)" and "China: Environmental Issues (2003)," from Country Analysis Briefings.
32 Energy Information Administration, U.S. Department of Energy. 2006. "U.S. Primary Energy Consumption and Carbon Dioxide Emissions."
33 See the *Harvard Business Review*'s issue "On Culture and Change," 2002. Cambridge, Massachusetts: Harvard Business School Press.

to be?" This process, and the answers to the overarching questions posed, guide both strategy and operating practices. A similar process—ideally supported by and led at the highest levels—is needed to guide climate change strategy in businesses.

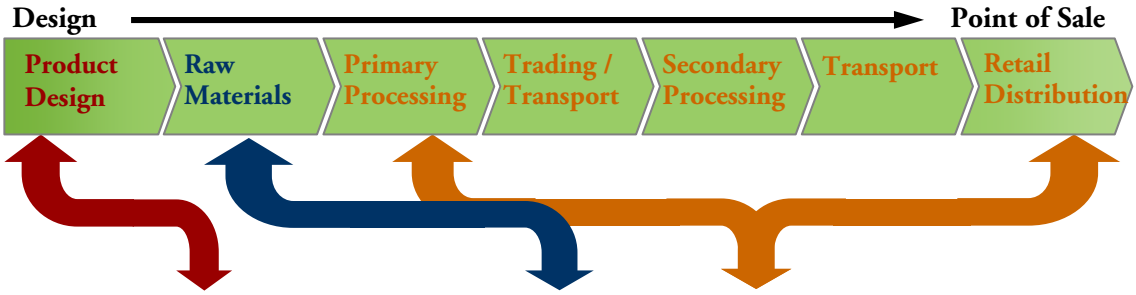
While specific changes in corporate culture and identity will need to be tailored for each company, the actions pursued across all companies will include the full spectrum of:[34]

- increasing the **efficiency of** current (and future) **energy use**,
- securing **offsets of emissions**, and
- sourcing **less carbon-intensive, and increasingly renewable-based energy**.

These three elements offer a complementary set of tiered efforts—all of which are important. In order to mitigate the business risks associated with climate change, however, it is clear from climate modeling that each of these strategies in isolation is inadequate. Instead, real gains can be made through synergies across these three areas of work and by integrated strategic planning throughout all aspects of business. The table on the following page begins to lay out the issues across corporate divisions and functions.

34 Actions have been well-articulated in publications by a growing array of players, including *Winning the Oil End Game* by Amory Lovins of the Rocky Mountain Institute et al. (Snowmass: CO: Rocky Mountain Institute, www.rmi.org) and Energize America's *Achieving U.S. Energy Security by 2020* (June 9, 2006; accessed October 10, 2006 from http://www.ea2020.org/drupal/files/EAYK.pdf). Other relevant organizations include: Alliance to Save Energy, Set America Free, the National Energy Policy Initiative, the Energy Future Coalition, American Energy Independence, the Apollo Alliance and Energy Action.

Table 1. Applying the Spectrum of Climate Change Action across the Value Chain



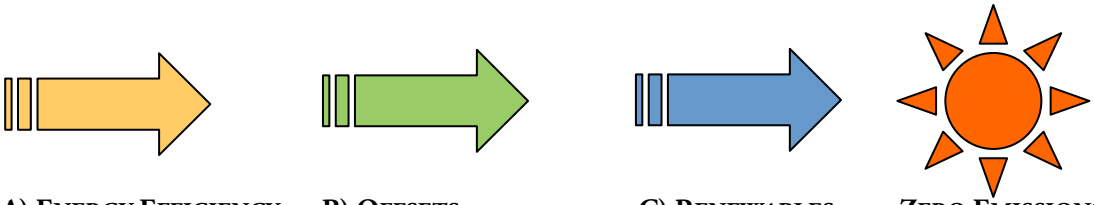
There is potential for three types of energy saving at every step of the process:			
Efficiency of Energy Use	Design for efficiency and use of renewables (*e.g.* materials selected, manufacturing processes specified, manufacturer location in relation to markets, product use, product takeback and re-use or recycling).	Increase energy efficiency in extraction and primary processing.	- Increase energy efficiency in production (*e.g.* building and factory design). - Cut energy use in supply chain (*e.g.* fleet efficiency, maximize use of rail).
Emissions Offsets	Engage in markets for offsetting emissions in the design phase.	Engage in markets for offsetting emissions from raw material sourcing.	- Engage in markets for offsetting emissions from processing through transport and distribution. - Make investments to enable sale of offset credits.
Renewable Sources of Energy	Buy renewable energy from existing provider or invest in own renewable energy sources (*e.g.* solar or wind installations).	Buy from existing provider or invest in own renewable energy sources.	- Buy from existing provider or invest in own renewable energy sources. - Invest in hybrid and other low-emitting sources of transport.

II. Taking Action

> *"Companies are taking action now because doing nothing is a strategy that is running out of steam. Like it or not, U.S. industry is beginning to accept that the issue of climate change is not going away."*
>
> - *Fortune Magazine*, 2006[35]

Businesses considering the move towards zero carbon have a range of options. The spectrum of efficiency, offsets and de-carbonized energy with a shift to renewables provides an expansive menu from which companies can devise the most effective mix for their business and operations.

These three elements interrelate: gains in one area can be amplified through work in the other areas. A company is paying for offsets has greater incentive to decrease energy use: the less energy, the fewer emissions, and fewer emissions means fewer offsets purchased. Similarly, the more renewable energy sourced, the fewer offsets, and less renewable energy is needed by a more energy efficient company. These "knock-on" effects across the spectrum offer the potential to optimize costs through increasing efficiency, offsetting emissions and sourcing renewable energy, all with the goal of zero emissions.



A) ENERGY EFFICIENCY **B) OFFSETS** **C) RENEWABLES** **ZERO EMISSIONS**

The bold actions needed to move towards zero emissions are not without precedent. Both long-time vocal corporate advocates of action on climate and other environmental issues, such as Interface Inc., and relative newcomers, such as Wal-Mart, are taking action on climate change. A growing range of businesses are exploring the steps of efficiency, offsets and renewables, as the examples below show.

35 Lustgarten, A. "For Sale: Pollution," *Fortune*, August 24, 2006. Accessed October 10, 2006 from http://money.cnn.com/2006/08/23/news/economy/carbon_exchange.fortune/.

Table 2. Business Examples: Exploring Efficiency, Offsets and Renewables

Energy Efficiency	Emissions Offsets	Renewable Energy	Emissions Reductions	Savings Thus Far (US$)
3M process and product improvements			50% over 15 yrs years	$200m
Alcan smelter improvements			65% over 10 years	Not Available
Bayer electrolysis and N_2O incineration	**Bayer** transactions in EU and CCX markets	**Bayer** organizational and energy supply changes	70% over 15 years	Not Available
BP internal efficiency goals	**BP** transactions in EU market	**BP** methane capture	18% over 3 years	$650m
DuPont enhanced nylon production	**DuPont** transactions in CCX market	**DuPont** goal of 10% renewables by 2010	69% over 15 years	$2.015b
IBM revised semi-conductor manufacturing	**IBM** transactions in CCX markets		65% over 15 years	$791m
Staples green building		**Staples** procurements and onsite generation	5% over 4 years	
STMicroelectronics energy efficiency measures	**STMicroelectronics** goal for net zero emissions by 2010	**STMicroelectronics** switch to fuel cells, co-generation	20% over 4 years	$900m
Toyota computerized forecasts of energy load, green building	**Toyota** thermal emissions recovery	**Toyota** purchase of 2m kWh/year in wind power	12% over 3 years	Not Available

Sources: Climate Group 2004, Bayer Sustainable Development Report 2005, Green Power Conferences 2006, Toyota Environmental and Social Report 2005, Carbon Disclosure Project 2004.

Our environmental goals at Wal-Mart are simple and straightforward:

1. To be supplied 100 percent by renewable energy.
2. To create zero waste.
3. To sell products that sustain our resources and environment.

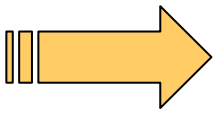
These goals are both ambitious and aspirational, and I'm not sure how to achieve them.....at least not yet.

- Lee Scott, CEO, WalMart, October 2005

A growing number of companies are annoucing audacious goals on climate change and the environment. The business context is changing, and forward-looking companies are beginning to focus on how to address climate change.

These corporate commitments are translating into savings due to increased efficiencies. The Climate Group, an organization of companies and governments, reviewed the efforts of 72 companies from 18 industries in 11 countries. The group estimated that the commitments reaped US$11.6 billion in savings, with four firms—Bayer, BT, DuPont and Norske Canada—accounting for US$4 billion of the total.

Energy Efficiency



> *"Nobody ever became vice-president by cutting the electricity bill. Yet, as electricity costs increase—particularly in Europe—businesses have become more concerned with energy. And climate change has focused companies on emissions. The confluence of these factors means that companies can save on energy and gain good PR on emissions reductions."*
>
> - *The Economist*, 2006[36]

From lighting to manufacturing to transport, companies rely on energy. If waste exists in any aspect of a company's business, it represents waste in energy usage. Energy efficiency permeates every aspect of what a company does—in sourcing, designing, producing, transporting and selling its products or services.

Re-thinking energy usage embraces all business elements, from buildings to operations. The main business functions to consider when thinking about energy efficiency include:

- Buildings and Operations
- Products and Product Design
- Production Processes
- Transportation

Buildings and Operations

> *"The 540,000-square-foot headquarters of the Netherlands' second largest bank [ING] is one of the most remarkable buildings in the world. It is largely day lit, highly energy efficient, and architecturally innovative… The building (really a series of interconnected towers) does not use conventional air conditioning—a feat virtually unheard of for a building of this size—relying primarily on passive cooling with back-up absorption chillers.*
>
> *The building uses less than a tenth the energy of its predecessor and a fifth that of a conventional new office building in Amsterdam. The annual energy savings are approximately $2.9 million*

36 *The Economist*. "A Coat of Green," September 7, 2006.

(1996 U.S. dollars) from features that added roughly $700,000 to the construction cost of the building—and were paid back in three months."

- Rocky Mountain Institute, 2006[37]

A wide range of actions contribute to increasing the efficiency of buildings and operations, and include both the more humble gestures of using compact fluorescent light bulbs or, when they become widely available, light emitting diodes (LEDs),[38] and more extensive re-modeling and building for energy efficiency.

Building operations' energy efficiency has considerable low-hanging fruit. Small scale changes, such as changing to compact fluorescent light bulbs, can translate into significant savings in energy usage. A simple statistic vividly illustrates the potential savings: if every American household replaced one light bulb with a compact fluorescent light bulb meeting U.S. EPA Energy Star standards, it would equal removing one million cars from the road.[39] Florescent light bulbs cost more but last longer, and their use would require purchase of fewer emissions offsets due to their efficiency. Savings in one area translate into savings in another within a broader climate change strategy.

Relatively basic steps related to insulation and cooling can translate into large returns in company-owned buildings.

The field of "green building" offers an expansive set of actions that can lessen energy usage in both rental and ownership contexts.[40] In its New York City headquarters, the Hearst Corporation included a waterfall designed to cool the lobby. The new Bank of America building will allow cafeteria leftovers to be turned into methane for electricity.[41]

Companies with "Green Buildings"

- Wal-Mart (Kansas and Wisconsin)
- ABN AMRO (Illinois)
- Banana Republic
- AT&T Network Systems Campus (Washington, D.C.)
- Duracell (Bethel, Connecticut)
- Steelcase Furniture Manufacturing Plant (Michigan)
- REI (Colorado)
- SC Johnson (Racine, Wisconsin)
- United Parcel Service Headquarters (Georgia)
- Sainsbury's (U.K.)
- Herman Miller
- Ford Motor Company
- PG&E (California)
- 3M (Wisconsin)
- Abbott (Illinois)
- Bank of America (California)
- Caterpillar (Illinois)

- "List of Registered Green Buildings," U.S. Green Building Council and RMI, 2006, and "Buildings and Land," Rocky Mountain Institute

37 Accessed October 10, 2006 from http://www.rmi.org/sitepages/pid208.php.
38 "An Even Brighter Idea," *The Economist*, September 21, 2006.
39 Information obtained October 10, 2006 from http://www.energystar.gov/index.cfm?c=cfls.pr_cfls.
40 For more information on green building, see the Rocky Mountain Institute (www.rmi.org), the U.S. Environmental Protection Agency (http://www.epa.gov/greenbuilding/), the U.S. Green Building Council (http://www.usgbc.org/) and the U.S. Department of Energy (http://www.eere.energy.gov/EE/buildings.html).
41 Stark, Betsy. "Big Companies Go Green to Ensure Business: GE, Wal-Mart Find Environmentalism Is Good for Profits," *ABC News*, September 1, 2006.

Research has shown that green buildings can significantly enhance worker productivity and reduce absentee rates. Since employee salaries are often one of the highest costs for many companies, this unintended consequence of green building can have noticeable, quantifiable business benefits.

Products and Product Design

> *"We are sold out of our solar products, we're sold out of our wind products … and we're pretty much sold out on some of our most efficient aircraft engines."*
>
> - Gary Sheffer, General Electric, 2006[42]

The market for climate-aware products is growing, from energy efficient products to clean technology and renewables-focused items. The design, sourcing and sales of energy efficient products offers an expanding area of business opportunity.

In product design, actions can be as simple as adding energy efficient specifications into the process. The design stage is a key point at which to introduce energy efficiency considerations. Design decisions determine more than 70 percent of the costs of product development and manufacture, and have a significant impact on end-of-life management for a product.[43] A design that minimizes energy consumption during its use saves customers the time and energy of making adjustments to a product after a purchase (such as wrapping water heaters with insulation blankets).

GE's Ecomagination division includes 32 "clean technology" products and US$10 billion in 2005 revenues, with forecasts of US$20 billion in revenues by 2010. R&D spending within the division will rise from US$700m—out of a total of US$5 billion across GE—to US$1.5 billion by 2010. Yet, within GE overall—with revenues of US$150 billion—Ecomagination is relatively small, and "the division's products are not that different from the rest of GE's offerings," potentially only representing normal improvements over time.

Nonetheless, the stage is being set and the trend is noteworthy. Clean technology is arriving.

- "Companies Cash in on Environment Awareness," *The Financial Times*, September 13, 2006, and "A Coat of Green," *The Economist*, September 7, 2006

42 Stark, Betsy. "Big Companies Go Green to Ensure Business: GE, Wal-Mart Find Environmentalism Is Good for Profits," *ABC News*, September 1, 2006.
43 National Research Council. 1991. *Improving Engineering Design: Designing for Competitive Advantage*. Washington, DC: National Academy Press.

The "hyper car" was designed for efficient fuel use and for aerodynamic "low drag," with the knowledge that significant amounts of gasoline were needed simply to propel the heavy metals that go into a car forward. In response, designers specified light weight composites and other key features—cutting the amount of fuel needed by 3 to 5 times.

-Rocky Mountain Institute, http://www.rmi.org/sitepages/pid386.php

Today, the design process is informed and constrained by three factors:

- the specifications for the product, service or need the design process will address,
- cost, schedule, available materials and processes, aesthetics and market considerations, and
- the knowledge and experience of the designers who shape the process and the range of options.

Within the bounds of these constraints is space for innovation. Adding energy efficiency could simply become another design requirement or constraint within which designers and engineers innovate.[44]

BMW buys 4.8MW of co-generated power from a neighboring landfill in South Carolina, at a savings of US$1 million per year.

- "BMW Manufacturing Landfill Gas Energy Project," U.S. EPA Landfill Methane Offset Program, 2006

Inspiration for product designers can be found in the field of biomimicry and by asking, "how does nature heat, cool or do any number of other tasks that require energy?"[45] The mechanisms used in nature can serve as points of departure for brainstorming, prototyping and innovating. For example, oak-hickory forests, redwood forests and other mature ecosystems highlight "closed-loop manufacturing," or operating on sunlight and the reuse of waste. "Industrial eco-parks" such as the one in Kalundborg, Denmark, select companies that are co-located in order to use one firm's by-products for another company's inputs.[46] Just as leaves falling are key inputs into creating soil fertility in forests, one company's byproduct is used effectively by another in creating product. The insights offered by biomimcry specialists can help in re-thinking products and becoming more energy efficient.

In the Netherlands, Shell is selling its carbon emissions to nearby horticultural businesses for their greenhouses. Shell receives direct payments for the excess CO_2, tax breaks to cover the infrastructure costs, as well as credits under the European trading scheme.

- de Lijser, H. "Gas for the Greenhouse," *Nature* Vol. 442, August 3, 2006

44 For more information on environmentally friendly design, see these sources: Geiser Kenneth. 2001. *Materials Matter*. Cambridge, MA: MIT Press. Maxwell D, van der Vorst R. 2003. "Developing Sustainable Products and Services." *Journal of Cleaner Production* 11(8):883. McDonough W, Braungart M. 2002. *Cradle to Cradle: Re-Making the Way We Make Things*. New York: North Point Press. Mont, O. 2002. "Clarifying the Concept of Product-Service System." *Journal of Cleaner Production*;10(3):237. Vogtlander J, Bijma A, Brezet H. 2002. "Communicating the Eco-Efficiency of Products and Services by Means of the Eco-Costs/Value Model." *Journal of Cleaner Production* 10(1):57.

45 http://biomimicry.net/intro.html; accessed October 10, 2006.

46 http://biomimicry.net/case_studies_processes.html; accessed October 10, 2006.

Finally, opportunities for climate-aware products lay not just in initial design, but also in planning for "end of life" and re-use through "re-manufacturing," as Caterpillar is exploring in China (see the box on the following page). The real opportunity lies in thinking expansively across products that can be designed and offered to customers through the production and re-production processes.

Caterpillar Inc. has signed an agreement with China's National Development and Reform Commission to promote the development of China's re-manufacturing industry. Caterpillar Remanufacturing Services is the first wholly owned foreign entity to receive a re-manufacturing license in China.

Greenbiz.com states that "Remanufacturing is a highly sophisticated form of recycling that takes end-of-life components and turns them into like-new products for a fraction of the cost. Our remanufacturing business is one of the fastest growing parts of our company because this technology helps our customers remain competitive and promotes a sustainable environment by reducing waste and the need for raw materials to make new parts."

- "Caterpillar to Help Develop Remanufacturing Industry in China," *GreenBiz*, September 15, 2006.

Production Processes

"The primary output of today's production processes is waste. Across all industries, less than 10% of everything that is extracted from the Earth (by weight) becomes useable products. The remaining 90% to 95% becomes waste from production….

So while businesses obsess over labor and financial capital efficiency, we have created possibly the most inefficient system of production in human history."

- Peter Senge, MIT and Goran Carstedt, Former President, IKEA & Volvo[47]

Efficiencies can be gained in production processes from simple steps such as adding insulation through more complex actions such as reducing friction in pipes used in factories. Motor-driven systems present an enormous potential source of savings because they use more than 70 percent of global manufacturing electricity annually.

In American Electric Power's Mountaineer coal plant in West Virginia, replacing a crooked valve in the main steam line results in a slowing of the flow on the way to the generator. Replacing it with a straight valve will save an estimated 30,000 tons of CO_2.

- Romm, J. & Browning, W. "Greening the Building and the Bottom Line," 1994

Production process and system optimization techniques can translate into energy savings of 20 percent or more across sectors and can reach 50 percent in some contexts. Optimization opportunities for steam systems can be even greater.[48]

47 Senge, Peter and Goran Carstedt. 2001. "Innovating Our Way to the Next Industrial Revolution.," *MIT Sloan Management Review*, 42(2): 28.

Despite potential benefits, energy savings from industrial systems have remained largely unrealized and represent an enormous area for gains. The "know-how" exists among specialists and leading companies. The Lawrence Berkeley National Laboratory and Ford Motor Company have documented the Ford approach to energy use system optimization.

Corporate managers can create permission to re-think production processes in order to realize energy savings.

Transportation

> *"We have one of the largest private fleets in the U.S. At today's prices, if we improve our fleet fuel mileage by just one mile per gallon, we can save over $ 52 million a year. We will increase our fleet efficiency by 25 % over the next 3 years and double it within ten years. If implemented across our entire fleet by 2015, this would amount to savings of more than $310 million a year. Compare that to doing nothing.*
>
> *By being the leader, we will not only change OUR fleet, but eventually change trucks everywhere in the world. We will do ourselves a big favor, clean the air for our children, create new jobs, improve U.S. productivity, positively impact our country's energy security, and more."*
>
> - Lee Scott, CEO, Wal-Mart, 2005[49]

Opportunities for increasing efficiencies in transportation cover the gamut, from vehicle fleets to transporting both materials and products.

Potential exists to shift to fleet vehicles with higher gas mileage and closer to zero emissions through "stronger, lighter, plug-in, flex fuel vehicles."[50] Honda and Toyota are among a growing number of companies that sell hybrid gas-electric cars. BMW, General Motors, Toyota and Honda have introduced hydrogen-fueled cars, albeit in small numbers.[51] According to Raymond Freymann of BMW, "The [hydrogen vehicle] technology is still in its early stages. But there will be a revolution when it finally arrives."[52]

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48 McKane, Aimee and Joseph C. Ghislain. 2006. "Energy Efficiency as Industrial Management Practice: The Ford Production System and Institutionalizing Energy Efficiency." SAE International
49 *The Financial Times*. "Companies Cash in on Environment Awareness," September 14, 2006.
50 Energize America. 2006. *Achieving U.S. Energy Security by 2020*. Accessed October 10, 2006 from http://www.ea2020.org/drupal/files/EAYK.pdf.
51 White, Joseph. "BMW Plans Hydrogen-Fueled Car," *The Wall Street Journal*, September 13, 2006.
52 Edmondson, Gail. "BMW's H-Bomb," *BusinessWeek*, September 12, 2006.

FedEx Express collaborated with Environmental Defense and the Eaton Corporation to introduce a low-emission, hybrid electric powered delivery vehicle that could become a standard medium-duty delivery truck for the FedEx Express fleet. The FedEx OptiFleet E700 hybrid electric vehicle will decrease particulate emissions by 90 percent, reduce smog-causing emissions by 75 percent and increase fuel efficiency by 50 percent.

David J. Bronczek, president of FedEx Express, states that "This hybrid electric truck demonstrates that technology is available now to begin to achieve environmental goals and meet our operational requirements. The environmental and business gains of this project signal a revolution in truck technology and set a new standard for the industry."

- Environmental Defense, "Press Release: FedEx Introduces Hybrid Electric Truck," 2003

Honda is introducing a flex-fuel engine in Brazil that can use ethanol and has also developed a diesel passenger car engine capable of meeting California's 2009 air-quality standards, with emissions that will be similar to those of a gasoline engine.[53] Engineers have developed a "hyper"-efficient car, which the Rocky Mountain Institute states is "designed to capture the synergies of: ultra light construction; low-drag design; hybrid-electric drive; and, efficient accessories to achieve 3- to 5-fold improvement in fuel economy, equal or better performance, safety, amenity and affordability, compared to today's vehicles."[54]

The food industry uses 15-20 percent of the total energy consumed in industrialized countries. This energy usage contributes significantly to climate change and is largely a result of food supply chains that have increased in length by 20 percent over the last two decades. Today, the average American food molecule travels 1500 miles. As the urgency of climate change grows, the industry increasingly faces the question: Can multinational food companies substantially reduce carbon emissions through local procurement of their agricultural resources? A growing number of companies have been addressing these issues by engaging in local food and agricultural procurement pilots, including Bon Appetit, Kaiser Permanente, Kroger, McDonalds, Sodexho, Sysco, Wal-Mart and Whole Foods.

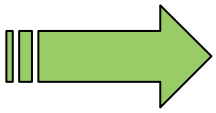
- Amory Lovins, "Energy and Sustainable Agriculture," 2005; Brian Halweil, "Home Grown: The Case for Local Food in a Global Market," 2002; Pirog, R., Van Pelt, T., Enshayan, K., and E. Cook, "Food, Fuel and Freeways," 2001.

Another approach to increasing transportation efficiency lies in considering the business system as a whole: in terms of where materials and markets exist and how to source in the localities where markets exist. Considerable work has been undertaken in local sourcing of food and agricultural products.

Strategies such as redesigning processes and products could have substantially larger, multiplicative impacts. Companies should consider the full impact potential of efficiency measures across the gamut—from fleets to production, retail and the end of life.

53 O'Dell, John. "Honda Unveils 'Super-Clean' Diesel Engine," *The Los Angeles Times*, September 25, 2006.
54 Accessed October 10, 2006 from http://www.rmi.org/sitepages/pid386.php.

Emissions Offsets



"The question really becomes when and how do we get to the next level of international commitment [on climate change regulation], and until that time, corporate America can and should continue its commitment on a voluntary basis."

- Michael G. Morris, CEO of American Electric Power and member of Chicago Climate Exchange

Companies from HSBC to Google to DuPont are increasingly engaging with carbon offsets. Multi-million dollar markets, both regulatory and voluntary, now exist in greenhouse gases. In 2005, market volume was approximately US$10 billion,[55] while in the first quarter of 2006 alone, emissions-related business transactions were valued at US$7.5 billion. Growth has been phenomenal and is expected to continue. Greenhouse gas emissions trading markets could reach US$2 trillion by 2012, according to a recent projection by a consortium of financial institutions.[56]

HSBC, Europe's largest bank, will pay over US$3 million in offsets this year and is thus the first major bank to achieve carbon neutrality. HSBC pays for the carbon dioxide emissions of every flight taken by its employees through investments in non-polluting energy projects at a cost of US$310,000. Flights represent about 10 percent of the bank's emissions. The other ways in which the bank emits are calculated to determine the final amount to be paid for total carbon neutrality.

- "Paying the Freight for Polluting the Air: Europe Takes the Lead," *The New York Times*, September 18, 2006

In the U.S., numerous voluntary offset programs have been launched. Due to state-level action, movement is underway and regulatory markets are emerging. In August of 2006, California adopted a cap on emissions that called for a 25 percent cut by 2020. In September 2006, Arizona became the twelfth state to unveil a greenhouse gas reduction strategy.[57] In April 2006, a number of companies, including Shell, BP, GE and Duke Energy, informed the Senate that they were prepared for U.S. federal government limits on greenhouse gas emissions.[58] The CEO of XCel, a major U.S. electricity and gas utility has stated, "Give us a date. Tell us how much we need to cut. Give us the flexibility to meet the goals, and we'll get it done."[59]

Climate Change Capital, a London-based company, has raised US$830 million to reduce greenhouse gases for credits to be sold in Europe. AES is putting US$325 million into a joint venture to produce 50 million tons of credits by 2012.

- "Warming is Hatching a Business," *The Washington Post*, September 27, 2006

55 InterCarbon. 2006. "Climate Protection Propels Economic Development." Accessed October 10, 2006 from http://lists.iisd.ca:81/read/messages?id=31013.
56 UNEPFI. 2005. "The Working Capital Report."
57 "Arizona Unveils Climate Strategy." *Environment News Service*, September 11, 2006. Accessed October 10, 2006 from http://www.ens-newswire.com/ens/sep2006/2006-09-11-01.asp.
58 U.S. Senate Committee on Energy and Natural Resources. "Senate Committee on Energy and Natural Resources Climate Conference," Washington D.C., April 3, 2006.
59 Carey, John & Shapiro, Sarah. "Global Warming," *BusinessWeek*, August 16, 2004.

A growing number of companies are anticipating regulatory change. In the U.S., interest in carbon markets, emission offsets and emission credits is growing.

Globally, the European Union Emissions Trading Scheme (EU ETS), the Chicago Climate Exchange and Australia's New South Wales Greenhouse Gas Abatement Scheme are the leading formal carbon markets. EU ETS, perhaps the most prominent, places a commercial value on greenhouse gases and is based on a cap for the entire continent's emissions. Companies are granted emission "allowances" and are required to buy from others if they exceed their allotment. Companies that emit less than their allotment may sell remaining credits. According to Point Carbon, an Oslo-based research firm, US$12.6 billion of greenhouse gas emission rights were traded in the first half of 2006.

In voluntary markets, providers such as 3 Phases or Community Energy invest in renewable energy sources when companies purchase CO_2 offsets. This approach offers the possibility of long-term infrastructure development through short-term focus on offsets.

> American Electric Power Corporation, Chevron-Texaco and General Motors have paid $18.4 million for climate credits with the Guaraqueçaba Climate Action Project (GCAP) in Brazil. The GCAP has sought to regenerate and restore natural forest and pastureland. It sells carbon emission offset credits for the 8.4 million metric tons of carbon dioxide the restoration project is expected to sequester in its lifetime. Thus far, the project is demonstrating ecological and economic benefits locally while helping the companies win brand recognition locally and hedge regulatory risks at home.
>
> - "For Sale : Pollution," *CNN Money*, August 24, 2006

Companies can be buyers of offsets or sellers of carbon credits. AES Corporation hopes to work with Asian palm oil plantations by installing equipment to suck methane, a greenhouse gas, out of waste lagoons to convert it into energy and thus receive credits it could use or sell in Europe.[60]

Ford Motor Company, International Paper, IBM, American Electric Power and a number of cities make up a portion of the 200 Chicago Climate Exchange (CCX) members. The members of the CCX buy and sell rights to emit six greenhouse gases. During the pilot phase from 2003 to 2006, members agreed to reduce greenhouse gas emissions by 1 percent per year from a baseline determined by their average emissions during 1998 to 2001. Currently, CCX members are focused on reducing emissions by 6 percent below their baseline amounts by 2010. When companies join CCX, an independent auditor assesses their emissions. If they reduce emissions more than the contractual amount, they have rights to sell. If they fail to meet targets, they must buy rights from another member or invest in an offset program.[61]

60 Mufson, Steven. "Warming Trend is Hatching a Business," *The Washington Post*, September 28, 2006.
61 Zwick, Steve. "Richard Sandor: The Maker of Markets," *Ecosystem Marketplace*, August 30, 2006.

The London-listed Climate Exchange, with support from Goldman Sachs,[62] recently purchased the remaining shares of the CCX and the European Carbon Exchange (ECX), the latter of which is a joint venture with the International Petroleum Exchange, the largest exchange trading carbon credits on the EU ETS. CCX has announced new exchanges and joint ventures around the globe, including the Montréal Climate Exchange and an agreement with India's Energy and Resources Institute to develop a greenhouse gas emission offset market in India.

In 2002, Nike and Delta Air Lines began an agreement in which both contribute to an offset fund that goes towards local sustainable energy projects. Nike has similar agreements with Hertz and Northwest Airlines. The company offsets 45 percent of its 47,754 tons of carbon emissions from business travel.

In Britain, British Airways makes an offset option available to travelers, but not specifically for corporations, on its Web site. "Although we don't have deals with corporate clients on carbon offsets, it won't be long before we do, and will likely have significant numbers in a short period of time," said Paul Marston, a British Airways spokesman.

- "Paying the Freight for Polluting the Air," *The New York Times*, September 2006

Expedia offers customers the opportunity to offset the climate impacts of their airline travel, based on calculations of the emissions from the mileage flown and how much renewable energy is needed for offsets. Three levels of payment exist: US$5.99 for a short-haul flight up to 2200 roundtrip miles, US$16.99 for the cross-country flight up to 6500 miles and US$29.99 for international flights up to 13,000 miles. Expedia partner TerraPass invests customers' voluntary payments in the development of renewable energy, such as wind power.

The program has gained immediate action from customers. In the first days of the program, Expedia customers offset more than a million pounds of carbon dioxide.

- "Hertz's 'Green' Cars," *The Wall Street Journal*, August 2006

CCX is unique in the U.S. as it is the only voluntary trading platform for carbon credits. However, it has come under intense criticism for having lax emissions reduction requirements, accepting low-quality and hard-to-quantify projects like no-till agriculture, and certifying emissions reductions that would have happened anyway under business-as-usual (called "non-additional reductions"). While CCX currently the only 'game in town,' regulated markets are emerging in the northeast and western states and may have a better shot at recognition under future federal climate regulation.[63]

There are a growing number of offsets through forestry projects, including work that Tetra Pak funded through its offsets in Uganda and the efforts of AEP, Chevron-Texaco and GM in Brazil. These projects sequester carbon through the planting of trees, particularly in fast-growing areas such as the tropics.

62 Thomas, Helen. "Goldman Takes Stake in Climate Exchange," *The Financial Times*, September 20, 2006.
63 Goodell, Jeff. "Capital Pollution Solution?" *The New York Times Magazine*, July 30, 2006.

A growing number of tree-planting projects have emerged in recent years to offset emissions. For example, Tetra Pak purchased about US$100,000 of carbon emissions credits that pay individual farmers in the Bushenyi district of Uganda to plant indigenous tree species. The payments involved the Edinburgh Center for Carbon Management and a Ugandan national conservation trust, Ecotrust. Thus far, over 100 farmers have participated.

Other examples of forestry-related offset programs include The Edinburgh Center for Carbon Management's Plan Vivo, which is "promoting sustainable livelihoods in rural communities through the creation of verifiable carbon credits" in Mexico, Mozambique, Uganda and India.

- "From Ugandan Schoolteacher to International Carbon Consultant: A Profile of Beatrice Ahimbisibwe," *Ecosystem Marketplace*, 2005

Many entrants to the carbon market are working to become carbon neutral through funding offsets of greenhouse gases that in turn result in new streams of funds for clean energy projects around the world. The motivations are as diverse as the players and range from brand enhancement to anticipating further regulation.

Risks to entering both the voluntary and regulatory markets exist, and while these markets are growing rapidly, they are not yet mature. Even in the European Union there have been issues and challenges. For example, *The Economist* reports that the EU is considering plans to extend its trading scheme (a cap-and-trade system) to airlines. To do so, the EU ETS will need to learn from early challenges in the allocation of emissions allowances. The initial allocation provided allowances for free to existing polluters. Many were able to maintain their current levels of emissions by purchasing inexpensive credits from developing countries under the Clean Development Mechanism (CDM), which did not reduce total emissions in Europe. In addition, the price of carbon dropped precipitously in May of 2006, when it was discovered that the baseline for emissions was set with inadequate data.

CarbonNeutral measures a company's "carbon footprint," buys the right amount of offsets in renewable energy projects and verifies the reliability of those projects. It charges a fee for its services. Its revenues have grown to US$4.7 million since the company was founded in 1997.

Showing similar growth, TEP Trading Two, a hedge fund trading in emissions allowances, had returns of 10-20 percent in 2005.

- "Paying the Freight for Polluting the Air," *The New York Times*, September 18, 2006, and "Are Storm Clouds Massing? These Traders Need to Know," *The New York Times*, May 17, 2006

There have been challenges with forestry projects that have led to the creation of the Climate, Community and Biodiversity Alliance's (CCBA) voluntary standards "to help design and identify land management projects that simultaneously minimize climate

change, support sustainable development and conserve biodiversity."[64] Without these kinds of standards, reforestation can easily lead to biodiversity loss as "monocultures" of the same species and age tree are planted, effectively creating a tree garden. Biodiversity thrives within complex, multi-species, multi-age mixes. Companies should have a sophisticated understanding of biodiversity issues in reforestation, as stakeholders can create costly PR episodes if companies are party to diminishing biodiversity in the name of addressing carbon concerns. Corporate decision-makers should also consider whether potential voluntary forestry projects are located in regions where forestry is rife with corruption and projects may be short-lived.

No issue is insurmountable; forestry projects have numerous benefits and can have strong PR value. Companies must choose reputable partners to ensure that appropriate due diligence on the ground is undertaken both prior to voluntary carbon work and throughout the forestry offset lifecycle.

These challenges are not uncommon in newly formed markets. Prospective entrants into voluntary markets need to thoroughly assess risks and potential. A prospective entrant could engage an experienced carbon credit brokerage firm to determine which offset projects would qualify under future regulation or are considered 'high-quality carbon offsets.' Brokerage firms will connect with either an 'offset provider,' which is an owner of an offset project that makes direct sales, or an 'offset aggregator,' which administers trades on behalf of multiple smaller offset-generating projects.[65]

Offsetting has its critics, who say that emissions must be reduced rather than offset. Some critics feel that companies are simply throwing money at a problem rather than considering new management practices with longer-term impacts.[66] These criticisms are a good reminder that offsets are only one part of a corporate climate strategy and should be selected only when reducing emissions is not feasible.

Regardless of where on the spectrum a company aims to be, calculating emissions and registering them with a recognized registry is increasingly becoming a wise strategy. Registries include the California Climate Action Registry in the U.S., the numerous European national registries reporting to the European Registry, and Japanese, Canadian and Russian registries reporting to the International Registry.[67] Registering emissions will position a company to anticipate emerging regulations across different regions. The benefits of gathering and formalizing emission data will also accrue as employees learn more about the nuances in the production process, identify waste and inform new efficiency metrics.

64 http://www.climate-standards.org/
65 CCX 2006. "Chicago Climate Exchange Offset Projects."
66 "Paying the Freight for Polluting the Air," *The New York Times*, September 18, 2006.
67 Carbon Registry Services. 2006. "Managing an Emission Portfolio and Transacting across Multiple Registries."

BP's move to encourage motorists to pay £20 a year to offset their driving emissions followed closely behind similar initiatives by Honda and Ford. BP's scheme was criticized by some environmentalists on the grounds that it would lead motorists to salve their consciences instead of taking steps to cut emissions from driving, such as buying a smaller car.

Robin Oakley of Greenpeace said: "So-called offsetting is better than doing nothing but only just. It's like smoking 20 cigarettes then going for a run to feel less guilty. As long as British vehicles are pumping tens of millions of ton of CO into the atmosphere every year, no amount of investment in clean energy projects built thousands of miles away will reduce the effect that our emissions are having on the climate."

- "BP Wants £20 from Motorists to Make Amends for CO_2 Emissions," *The Financial Times*, August 23, 2006

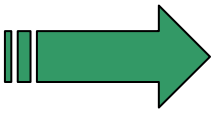
After calculating emissions, a company can explore voluntary carbon market options using a basic set of questions, illustrated in the table below.

Table 3. Questions To Ask While Exploring Voluntary Carbon Markets

Programmatic Robustness		
i.	Measurable Results	Are the most appropriate metrics in use?
ii.	Durability	What is the likelihood for sustained funding and political support?
iii.	Impact on GHG Reduction	What is the impact at an operational and product level?
Scalability		
i.	Boundaries	What company boundaries, such as operations and products, are included in the program?
ii.	Volume	How many companies could potentially qualify? Are program criteria ratcheted up as companies meet them? What skills and investments are needed to participate?
iii.	Expansion	Does participation stimulate commitment to climate change strategies beyond a 'business as usual' trajectory?
Tangible Business Benefits		
i.	Financial Return	What impact is there relative to the time and money spent on participating?
ii.	Operational Impact	What contribution has participation made to company performance and resource efficiency?
iii.	Industry Fit	Which industries tend to participate most and least?

Intangible Business Benefits		
i.	Regulatory	How would participation reward behavior in future regulation? Does the program minimize regulatory uncertainty or provide a 'training period?' Does the program allow for business monitoring of or input on future regulatory design?
ii.	Reputation	How does participation build relationships with stakeholders? Does participation come with a PR bump? Does the program provide the opportunity for accurate media coverage?
iii.	Access to Capital	Does participation help internal employees to get the funding they are looking for? Does participation open access to new capital streams?

Renewable Energy



"This is contingent investment. We think the political commitment to renewables around the world will grow, and we'll have more of the answers than our competitors will. We're happier with our position than we were three years ago, because the world seems more inclined to change."

- Chris Mottershead, BP's Advisor on Energy and the Environment, 2006 [68]

As companies pursue energy efficiency and offsets, they should also consider another "plank" in a climate change strategy: de-carbonized energy and sourcing renewable energy for use throughout operations. Recent statistics show that many new technologies for renewable energy are, or will soon be, competitive with fossil fuels. Some renewables such as ethanol are already competitive with fossil fuel energy in terms of production costs, but subsidies keep their market prices artificially high.[69] Dramatic renewable energy market expansion and growth rates, as well as increased investments, are driving down costs for renewables and prompting technological advances.

68 "A Coat of Green," *The Economist*, September 7, 2006.
69 Lamberg, Ryan. "Focus on Biofuels," Community Biofuels Presentation at the Commonwealth Club of California, October 5, 2006.

Since 2000, global wind energy generation has more than tripled, solar cell production has risen six-fold, production of fuel ethanol from crops has more than doubled and biodiesel production has expanded nearly four-fold. Annual global investment in "new" renewable energy has risen almost six-fold since 1995, with cumulative investment over this period totaling nearly US$180 billion.

- "American Energy: The Renewable Path to Energy Security," American Energy Initiative, 2006

Companies are increasingly exploring renewables, particularly ethanol, to stretch gas supplies and make transportation fuel burn more cleanly. Many corn-ethanol plants in the U.S. are making 35 percent returns and expect the industry to double in size by 2008.[70] Solar and wind power are other elements of corporate efforts to explore alternatives to current energy sources and prices.

In the race to identify a new source of energy, big names in industries unaccustomed to producing energy are placing their bets. Archer Daniel Midlands from agribusiness and DuPont from the chemical industry are head-to-head with lesser-known biotech companies like Abengoa Energy (with Cargill) and Iogen (with Goldman Sachs and Royal Dutch Shell). The race is to commercialize the most energy-rich biofuels that can be grown more plentifully than corn. Yet the risks of these investments relate to potential agricultural production impacts of climate change, particularly shifting rain patterns. If grain shortages continue globally, use of agricultural land and products for energy may become more controversial.

"We have identified renewable energy as an absolute growth market," says Thomas Pütter, chief executive of German financial company Allianz Capital Partners. He points to China's interest in wind and China's goal of mapping its entire country to build the world's largest wind-power farm, with output of 200 gigawatts.

Allianz has created a group focused on renewable-energy investments and estimates that in the next five years it will have about US$600 million invested in renewable-energy projects, with much of this total invested in wind power.

- "Weather or Not?," *Time Magazine*, November 2006

Honda's R&D department is partnering with the Research Institute of Innovative Technology for the Earth (RITE) to produce fuel from cellulose, including inedible leaves and stalks, in soft biomass. This represents a significant step towards commercialization of high-yield biomass as a fuel source.

- "RITE and Honda Jointly Develop New Technology to Produce Ethanol from Cellulosic Biomass," *Japan's Corporate News*, 2006

70 Fialka, J & Kilman, S. "Big Players Join Race to Put Farm Waste Into Your Gas Tank," *The Wall Street Journal*, June 29, 2006.

Companies not directly involved in the growth of these renewable energy markets have a few options. One approach is to generate renewable power onsite through wind or solar power.

Corporate investment in solar power is rapidly expanding as a result of state incentives, federal tax credits and long-term electric contracts that translate into a business case for investment. Roofs are being transformed from a sunk cost into a source of savings through the installation of solar panels. Solar panels provide energy over time, thereby reducing expenditures on electricity, but they also offer a buffer against price fluctuations in energy costs. Roofs become an unlikely site for good PR value. A growing number of companies are combining government incentives and subsidies with "green" brand value and investing in solar energy.

> Nike's Customer Service Center in Laakdal, Belgium, is responsible for distribution of all Nike products across Europe, the Middle East and Africa. In June 2006, Nike CSC began receiving electricity from a 9 megawatt wind power park located on its premises, making it one of the largest corporate onsite wind power projects in Europe. The wind park is capable of generating 22 million kilowatt-hours of green power annually: enough electricity to meet the demands of approximately 8000 European households. This makes Nike CSC one of the first European corporate facilities of its size to be powered by 100 percent green electricity.
>
> - "Nike's CSC's Onsite Wind Park," Green Power Market Development Group—Europe, 2006

Wind power is quickly becoming a viable alternative, not just in affluent parts of the world but also in rapidly expanding economies. In the U.S. in August 2006, the generating capacity of wind energy projects exceeded 10,000 megawatts, which is significant given that a megawatt of wind power generates enough electricity to serve 250 to 300 average-sized homes.[71] These 10,000 megawatts of wind power result in avoidance of 16 million tons of carbon dioxide emissions every year. Internationally, the demand for wind turbines has accelerated in India, where installations rose nearly 48 percent in 2005, and in China, where they rose 65 percent during the same year.[72]

> Staples is launching New England's largest solar power installation, which will supply 15 percent of the company's 500,000 square foot distribution center.
>
> FedEx runs its Oakland airport operations almost exclusively on solar power, with savings that will last for decades. "We will have a clean renewable supply of power at a consistent price, free, from the sun, for 30 years," FedEx director of environmental programs Mitch Jackson said.
>
> - "Big Companies Go Green to Ensure Business: GE, Wal-Mart Find Environmentalism Is Good for Profits," *ABC News*, September 1, 2006 and "Solar Power's New Dawn," *Hartford Courant*, September 6, 2006

71 Lowe, Alex and Katie Barnes. "Leashing the Wind," *The Columbia Missourian*, September 24, 2006.
72 Bradsher, Keith. "The Ascent of Wind Power," *The New York Times*, September 28, 2006.

Companies not yet ready to invest in their own solar, wind or other renewable energy infrastructure can work with their existing energy providers to increase their share of renewables in the energy mix that they draw upon.

In 2005, IBM announced that it would purchase 96,000 MWhr of certified Renewable Energy Certificates (RECs). When combined with the company's renewable energy purchases, these RECs increase IBM's renewable energy portfolio to an equivalent of 4 percent of its electrical usage in the U.S.

In early 2006, Whole Foods Markets upped the ante by purchasing enough RECs to offset 100 percent of its electricity usage in all of its facilities.

Most recently, Wells Fargo became the largest corporate purchaser of renewable energy credits through a purchase from 3 Phases Energy that represents 550MW of certified wind power over three years and 40 percent of the company's energy consumption.

- "Energy and GHG Emissions Management," IBM, May 5, 2005; "Whole Foods Market Makes Largest Ever Purchase of Wind Energy Credits in United States," Whole Foods, January 10, 2006; "Wells Fargo Commits to Largest-Ever Corporate Purchase of Renewable Energy in U.S.," Wells Fargo, October 16, 2006.

When electricity from renewable sources is not available through local utilities or directly to a company's operations, companies can choose to purchase 'renewable energy credits' (RECs). An REC represents one megawatt hour of renewable energy as measured from its generator, wherever that may be. The generator sells the renewable energy onto the local grid as a commodity, and the REC represents the group of environmental benefits associated with the production of renewable power. This "de-bundling" of goods allows companies to support the growth of renewable energy sources without buying renewable energy directly. REC prices tend to vary widely in voluntary markets: less than US$30/MWh for small hydro projects, US$55/MWh for biomass and wind projects and a range of US$35-230/MWH for solar projects.[73]

"The more you can help produce renewable energy sources, the less dependent we will be on oil and natural gas, which could in turn lower energy prices," said Tom Parish, a corporate properties director for Wells Fargo.

"It's good public relations for businesses," said Tim Kawakami, director of business management for Xcel Energy Inc., the country's top supplier of wind power to retail customers. "It also provides the financial incentives for renewable generation [of electricity] and for utilities to buy that generation."

- "Wells Fargo Gets in the Wind," *The Star Tribune*, October 3, 2006

73 National Renewable Energy Laboratory. 2004. "Wholesale Voluntary REC Prices, by Resource Type."

III. Adapting to Change and Leveraging Climate Initiatives for Corporate Excellence

"There are two main ways we can respond to climate change: we can adapt, or we can try to slow the process. In practice, we will do both."

- Frances Cairncross, Chair, Economic and Social Research Council[74]

"At Ford, energy has been included in the business plan, with targets set and cascaded throughout the organization. It then is tracked monthly on the plant and division scorecards. The inputs that drive the results are owned by the people on the plant floor. The user becomes empowered to take the actions to reduce energy. To ensure that it remains institutionalized, energy has been included in the operating procedures and the same problem solving tools that are used to solve other manufacturing problems are used to reduce energy. This further ingrains energy efficiency in the system because it becomes a problem that a team can correct by using the tools they already know and does not take any additional training or resources."

- Joseph Ghislain, Ford Motor Company[75]

Since climate change is already underway, the questions for corporate strategists are action and adaptation. Actions will focus on the trilogy of energy efficiency, emissions offsets and renewable energy sourcing. Once a commitment is made and corporate goals of zero emissions are set forth, the difficult work of organizational change begins.

The hallmarks of durable change initiatives have been the subject of extensive research in management studies. The task of managing change in energy usage uniquely requires the involvement of people within all levels of companies to act as leaders for change. Senior corporate leaders can underscore the importance of climate change action by folding climate change strategy into the identity of the firm—which becomes focused on emitting less and less over time—while identifying new growth markets for the company. It will be important for companies to clearly and consistently describe the issue of climate change and emphasize that climate is not inevitable and can be mitigated, while providing concrete actions that individuals can take to contribute to a corporation-wide solution.[76]

74 Von Radowitz, J. 2006. "Adapt to Climate Change, World Leaders Warned," *The Independent*.
75 Joseph Ghislain and Aimee McKane. 2006. "Energy Efficiency as Industrial Management Practice," *SAE International*.
76 Doppelt, Robert. Forthcoming. "Practical Steps for People to Create Change in Organizations," in Jon Isham and Sissel Waage, editors, *Ignition: Launching the U.S. Movement for Climate Change Action*.

Decades of organizational change research have led to clear guidelines for successful organizational change[77] that include:

- **Initiate change before the threat becomes severe.**
  Scientific consensus has emerged—climate change is underway and action must be taken within the next few years to avert projected scenarios.

- **Allow sufficient time and resources for implementation, particularly in relation to core changes.**
  As evident from the range of activities covered in this report, climate change strategies can affect almost every aspect of the operations of a company. As with all organizational change, a phased approach with strong leadership and regular check-ins is necessary.

- **Build a broad base of change agents within the company.**
  Offer professional development and educational opportunities to employees across a range of functions and business units. When desired, select individuals with strong leadership skills, but otherwise, let leadership grow via education and self-motivation.

- **Alter work processes to establish changes.**
  As corporate climate change strategies move to implementation stages, it is likely that, particularly in the short-term, companies will have to consider a shift in how they think about energy costs for products, processes and services. More comprehensive data management will be required over the short term, more flexibility in energy budgeting over the medium term and increased re-investments for technological improvements over the longer term.

- **Foster a culture that empowers people.**
  Motivating people for change without empowering them to effect change is one of the most common obstacles to effective change management. Line managers who are empowered to enhance data management can take control of their energy use, predict future energy requirements and manage peak energy usage.

- **Build internal capacity, and avoid long-term dependence on external entities.**
  Partnering with external entities, such as those mentioned in this report, is a good idea for companies newer to managing climate risk. External partners should be engaged with the intent to build capacity among company managers to ensure that employees feel in control and are enabled to innovate towards new competitive advantages for the company.

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77 Guidelines adapted from Waage, Sissel and Julie Torok. 2003. "Organizational Change for Sustainability within Enterprises and Financial Services," in Sissel Waage, editor. *Ants, Galileo and Gandhi: Designing the Future of Business through Nature, Genius and Compass*. Sheffield, U.K.: Greenleaf Publishing. Sources include: Belasco (1990), Haunschild and Miner (1997), Haveman (1992), Kotter and Cohen (2002), Kouzes and Posner (1990), Krackhardt (1990), Pfeffer (1981), Pfeffer and Salancik (1978), Quinn and Spreizter (1997) and Thompson (1967).

- **Seek to support and inform change initiatives through existing professional networks.**
  The climate arena is rapidly changing. Perhaps the most efficient way to keep employee leaders up to speed is through existing professional networks. Major business associations now have climate change working groups, including The Business Roundtable's Climate RESOLVE. Industry groups are forming their own task forces, such as those run by UNEP FI, IPIECA and PEG. A number of training curricula have emerged specifically for corporate directors (such as the curriculum developed by Yale, Marsh and CERES), senior executives (including the Prince of Wales Business & Environment Programme), middle managers (such as The Climate Project train-the-trainers program) and office workers (including WRI's "Green Office Guide").

- **Expand on established routines and competencies.**
  Organizational change is most effective when upheaval to other business processes is minimized. Rather than overlaying new initiatives and programs, tweak current processes and practices so that the default for business practice is zero emissions. Doing so will allow a company to take advantage of the finely-tuned processes that have won it past success.

- **Appeal to people's emotions.**
  Climate change offers one of the ultimate motivators related to finding the "heart of change,"[78] as it speaks to range of concerns from the local (such as quality of life and air quality) to the regional (like economic health and real estate values) to the global (including political stability and global justice).

- **Communicate early, fully and often.**
  By embedding climate change goals and targets into regular communications with commercial and retail customers, a company both builds trusting relationships and empowers customers to undertake their own climate change-related decisions in an informed manner.

Given the magnitude of the challenges faced by companies to move toward zero greenhouse gas emissions, corporate action on climate change strategy is likely to require the kind of "bullet train thinking" that Jack Welch has described:

> "If you do know how to get there it's not a stretch target…. The CEO of Yokogawa, our Japanese partner in the medical systems business, calls this concept 'bullet train thinking.' That is, if you want a 10-mile per hour increase in train speed, you tinker with horsepower, but if you want to

78 Kotter, John and Dan Cohen. 2002. *The Heart of Change: Real-Life Stories of How People Change Their Organizations.* Harvard University Press.

double its speed, you have to break out of both conventional thinking and conventional performance expectations."[79]

Stretch targets will be particularly relevant in adapting to climate change, as adaptation will require companies to consider operations in a hotter, drier world, especially in poorer countries. It will necessitate thinking about energy supply, crops, temperature control in buildings, flood control and coastal development—all within the efficiency, offsets and renewables context.

The risks and challenges related to climate change are great, and the opportunities are still emerging. Early adopters will define and shape the way forward.

"It is not the strongest of the species that survives, nor the most intelligent; it is the one most adaptable to change."

-Charles Darwin, 1859[80]

79 Quoted in Gupta, A. and V. Govindarajan. 2000. "Knowledge Management's Social Dimension: Lessons from Nucor Steel," *MIT Sloan Management Review*, 42(1): 78.
80 Darwin, Charles. 1859. *The Origin of Species*, Gramercy.

Appendix: New BSR Initiatives on Climate Change

Efficiency

Growing Multinational Food Company's Local Procurement Practices: Tools for Addressing Climate Change Impacts of Supply Chains

The food sector consumes about 15 percent of the total energy used in industrialized countries.[81] The sector's energy emissions contribute significantly to climate change and are largely a result of food supply chains that have increased in length by 20 percent over the last two decades.[82] As the urgency of climate change grows, the question arises: Can multinational food companies substantially reduce carbon emissions through local procurement of their agricultural resources?

BSR is launching an initiative focused on three activities:

- Building the Business Case and Documenting Implementation Lessons
- Conducting a Sector-Specific Opportunity Analysis
- Developing and Piloting Tools for Local Procurement

OUTCOMES

Business Case and Lessons from Implementation
Trends Report A report addressing a wide variety of trends that are merging to create a potentially compelling business case for local sourcing, including cost of oil, carbon regulation, brand management, fresh taste, port accessibility, impact of climate change on agricultural yields, community economic development, hunger, nutrition and food safety.
Business Brief on Implementation Lessons Based on in-depth interviews with professionals in CSR, procurement, civil society and academia, a Business Brief will present detailed case studies, expound on key business risks and opportunities of current pilot projects and identify pragmatic approaches to implementing local sourcing programs.

81 Lovins, Amory. 2005. "Energy and Sustainable Agriculture." Snowmass, Colorado: Rocky Mountain Institute.
82 Hailwell, Brian. 2002. *Home Grown: The Case for Local Food in a Global Market*. Washington, D.C.: Worldwatch Institute.

Industry-Specific Analysis
Supply Chain Sector-Specific Opportunity Analysis An analysis of food companies representing different industry sectors in the supply chain that identifies where the strongest business case can be made and where the greatest opportunities for environmental and community development benefits lie. The analysis will include research on the modes of transportation and distance traveled under current sourcing practices and the potential for alternative sources based on regionally available crops and locations of key business operations.
Tool Development and Piloting
Develop and Pilot Toolkit for Implementing Local Food Procurement Sector-specific toolkits for managing local procurement will be co-developed with companies and their value chain partners. These toolkits may address: a) Selecting a method for credibly defining and communicating 'local' or 'regional' b) Modeling the cost benefits of local procurement in a carbon-constrained future c) Assessing the range of tangible and intangible impacts of sourcing to core business issues such as brand value, local license to operate and supplier loyalty d) Managing food security risks through local sourcing

Emissions Offsets

I. Advancing Business Participation in Voluntary Climate Change Initiatives

Today's companies are overwhelmed with choices among voluntary climate change initiatives. There are dozens of voluntary programs offered by federal and state governments, NGOs and trade associations, but few ways to identify the relative merits of the programs. And, companies vary greatly in what they hope to achieve with a voluntary initiative. Where does a corporate manager begin?

Thus far, there have been no efforts to rigorously evaluate the environmental and business benefits of participating in voluntary climate programs from a corporate manager's perspective. Few tools exist to assist companies in identifying the best programs for their needs and goals. The sponsoring organizations of many voluntary programs find it difficult to gather feedback from companies on what program elements and incentives are the most productive in a corporate setting.

OUTCOMES

In response to these challenges, BSR proposes to develop a matrix analysis of federal, state, trade association and NGO voluntary initiatives, together with a companion assessment tool for corporate managers. Together with our partners at the U.S.

Environmental Protection Agency and various non-governmental climate change initiatives, BSR will produce the following tools and analyses:

Public Report
Catalogue and Assessment of Corporate Voluntary Climate Change Initiatives Analysis of program documents and extensive interviews with corporate managers, environmental scientists and economists, and staff of the voluntary programs. The assessment will include initiatives that involve inventories, disclosure, energy efficiency, carbon offsets, renewables and carbon-neutral products.
Customizable Search Engine
Web-Based Tool for Comparing Voluntary Climate Change Initiatives The web-based tool, available at www.climatebiz.com (created through a partnership between BSR and GreenBiz.com), will allow corporate managers to enter company-specific information—such as region, scale of operations, revenues and history of climate change action—and search for the most environmentally- and cost-effective voluntary climate change programs for their business. The tool will provide corporate managers with a customized, high-level filter of the numerous voluntary climate change programs available, while providing highlights of the environmental and business benefits of the recommended programs and relevant case studies to equip managers to make the case for climate change action at their company.
Business Input to Voluntary Program Design
Final Report to Voluntary Programs Through extensive interviews with companies in Phase I and II as well as through a feedback template integrated into the online tool, the final report will provide voluntary program coordinators and developers with valuable feedback from the business community to help guide program design and enhance scalability. BSR will work with program coordinators to facilitate improved communications and outreach between companies and program technical experts.

II. Environmental Markets: Risks and Opportunities for Business

Businesses rely on well-functioning ecosystems—for raw material inputs, production processes and climate stability. In addition, robust business environments are dependent upon healthy ecosystems that can provide services ranging from clean water to carbon sequestration. Yet, according to recent scientific assessments, 60-70 percent of ecosystem services are being degraded faster than they can recover, creating new costs, disruptions and investment risk for companies. Until recently, there have been few mechanisms for easily investing in maintaining ecosystem structures and functions, but now such mechanisms are emerging. Today, multi-million dollar markets exist in greenhouse gases, in wetlands, in water pollution and even in endangered species habitat. As these markets expand, businesses increasingly face the questions of whether, when and how to engage.

Our new Environmental Markets Trends Report outlines these new mechanisms, and our new two-year Environmental Markets Initiative will facilitate dialogue and joint research between business leaders, policy-makers, economists and environmental scientists in order to:

- Conduct industry-specific analyses of the business risks and opportunities of these new market mechanisms;
- Develop guides and implementation tools for member companies to access environmental markets; and
- Create a mechanism for business input into the future design of environmental market mechanisms.

OUTCOMES

Together with our partners at Ecosystem Marketplace, Stanford University, the United Nations Environment Program and the U.S. Environmental Protection Agency, BSR will produce the following tools and analyses:

Business Tools
Manager's Resource Guide A guide to internal planning, strategy and partnership opportunities.
Business Web Portal A searchable database of business-relevant case studies (successes *and* failures), an overview of voluntary and regulatory markets, real-time market information and an analysis of different strategies for company involvement (*e.g.* which voluntary markets are the most promising).
Market Overview A compendium of all relevant transactions and a market snapshot of real-time information.
Industry-Specific Analyses (Focus: Water, Carbon & Biodiversity)
Industry-Specific "Deep Dive" Analyses An in-depth analysis to objectively assess the business case by sector.
Industry-Specific Working Groups A peer learning network (either as a stand-alone group or as a sub-set of existing BSR working groups) to share best practices and identify information needs.
Business and Policy Dialogue
Three Multi-Stakeholder Roundtables on Market Design Facilitated dialogue between representatives from business, research, NGOs and government on smart policy design for environmental services protection.

Renewable Energy

Fueling Mobility in a Carbon-Constrained World

For more than a century, the transport sector has had 'one horse' when it comes to fuel: oil. But with increasing oil prices, instability in oil-rich regions, growing concerns about oil's impacts on climate change and escalating energy demand from China and other emerging economies, we are starting to see a true 'horse race' among transportation fuels. Potential alternatives to fossil fuels for mobile sources include hybrid-electric technology, bio-diesel, synthetic fuels, ethanol and hydrogen. Biofuels such as bio-diesel and ethanol have recently been center stage, partially due to some strong backing in the agricultural sector. Oil and auto companies are in the process of 'picking a horse,' and the investments they make now will shape the future economy, as well as the future climate, for decades to come.

Investments in biofuel technologies are an entirely new type of development. Oil and gas companies will need to partner with auto companies to optimize fuel performance for future engine design, but they will also need to consider partnering with agricultural companies, for the first time, to ensure consistent and high-quality feedstocks.

BSR aims to create a multi-industry forum that enables auto, agricultural and oil and gas companies to discuss the following questions:

- What risks exists for commercializing biofuels in certain markets? How might stakeholders respond to our efforts, and how can we prepare to address their concerns?
- Do biofuel crops offer a true economic opportunity for developing nations? How do we ensure that farmers in developing nations benefit from a new generation of 'green collar' jobs?

OUTCOMES

The proposed forum will bring together representatives of a spectrum of BSR member and non-member companies, as well as representatives from select stakeholder groups, in order to deliver the following:

Stakeholder Mapping
"The Lay of the Land" Report The report examining how stakeholders are positioning themselves around biofuels and which stakeholders should be prioritized for engagement.
Case Study Compendium A compendium of relevant cases where developing countries have been impacted, positively or negatively, by supplying biofuels to industrialized markets.

Industry Working Groups
Series of Dialogues for Auto, Agriculture and Oil and Gas Companies A closed-door working group that meets three times a year to discuss strategies in a candid, safe environment.
Multi-Stakeholder Dialogue
"The Good, the Bad and the Ugly" of Biofuels A series of engagements with pre-identified stakeholder groups seen as key to business strategy. Engagements will be facilitated by BSR in both industrialized and developing country locations.